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materials, or any other waste materials identified by the regulatory authority that are exposed, used, or produced during mining shall be covered with a minimum of 4 feet of nontoxic and noncombustible material; or, if necessary, treated to neutralize toxicity in order to prevent water pollution and sustained combustion, and to minimize adverse effects on plant growth and land uses. Where necessary to protect against upward migration of salts, exposure by erosion, to provide an adequate depth for plant growth, or to otherwise meet local conditions, the regulatory authority shall specify thicker amounts of cover using nontoxic material. Acid-forming or toxic-forming material shall not be buried or stored in proximity to a drainage course so as to cause or pose a threat of water pollution or otherwise violate the provisions of §715.17 of this part.

(2) *Stabilization.* Backfilled materials shall be selectively placed and compacted wherever necessary to prevent leaching of toxic-forming materials into surface or subsurface waters in accordance with §715.17 and wherever necessary to ensure the stability of the backfilled materials. The method of compacting material and the design specifications shall be approved by the regulatory authority before the toxic materials are covered.

(3) *Use of waste materials as fill.* Before waste materials from a coal preparation or conversion facility or from other activities conducted outside the permit area such as municipal wastes are used for fill material, it must be demonstrated to the regulatory authority by hydrogeological means and chemical and physical analyses that use of these materials will not adversely affect water quality, water flow, and vegetation; will not present hazards to public health and safety; and will not cause instability in the backfilled area.

(k) *Grading along the contour.* All final grading, preparation of overburden before replacement of topsoil, and placement of topsoil, in accordance with §715.16, shall be done along the contour to minimize subsequent erosion and instability. If such grading, preparation or placement along the

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contour would be hazardous to equipment operators then grading, preparation or placement in a direction other than generally parallel to the contour may be used. In all cases, grading, preparation, or placement shall be conducted in a manner which minimizes erosion and provides a surface for replacement of topsoil which will minimize slippage.

[42 FR 62680, Dec. 13, 1977; 43 FR 2721, Jan. 19, 1978, as amended at 47 FR 18553, Apr. 29, 1982]

§715.15 Disposal of excess spoil.

(a) *General requirements.* (1) Spoil not required to achieve the approximate original contour within the area where overburden has been removed shall be hauled or conveyed to and placed in designated disposal areas within a permit area, if the disposal areas are authorized for such purposes in the approved permit application in accordance with paragraphs (a) through (d) of this section. The spoil shall be placed in a controlled manner to ensure—

(i) That leachate and surface runoff from the fill will not degrade surface or ground waters or exceed the effluent limitations of §715.17(a)

(ii) Stability of the fill; and

(iii) That the land mass designated as the disposal area is suitable for reclamation and revegetation compatible with the natural surroundings.

(2) The fill shall be designed using recognized professional standards, certified by a registered professional engineer, and approved by the regulatory authority.

(3) All vegetative and organic materials shall be removed from the disposal area and the topsoil shall be removed, segregated, and stored or replaced under §715.16. If approved by the regulatory authority, organic material may be used as mulch or may be included in the topsoil to control erosion, promote growth of vegetation, or increase the moisture retention of the soil.

(4) Slope protection shall be provided to minimize surface erosion at the site. Diversion design shall conform with the requirements of §715.17(c). All disturbed areas, including diversion ditches that are not riprapped, shall be vegetated upon completion of construction.

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(5) The disposal areas shall be located on the most moderately sloping and naturally stable areas available as approved by the regulatory authority. If such placement provides additional stability and prevents mass movement, fill materials suitable for disposal shall be placed upon or above a natural terrace, bench, or berm.

(6) The spoil shall be hauled or conveyed and placed in horizontal lifts in a controlled manner, concurrently compacted as necessary to ensure mass stability and prevent mass movement, covered, and graded to allow surface and subsurface drainage to be compatible with the natural surroundings and ensure a long-term static safety factor of 1.5.

(7) The final configuration of the fill must be suitable for postmining land uses approved in accordance with § 715.13, except that no depressions or impoundments shall be allowed on the completed fill.

(8) Terraces may be utilized to control erosion and enhance stability if approved by the regulatory authority and consistent with § 715.14(b)(2).

(9) Where the slope in the disposal area exceeds $1v:2.8h$ (36 percent), or such lesser slope as may be designated by the regulatory authority based on local conditions, keyway cuts (excavations to stable bedrock) or rock toe buttresses shall be constructed to stabilize the fill. Where the toe of the spoil rests on a downslope, stability analyses shall be performed to determine the size of rock toe buttresses and key way cuts.

(10) The fill shall be inspected for stability by a registered engineer or other qualified professional specialist experienced in the construction of earth and rockfill embankments at least quarterly throughout construction and during the following critical construction periods: (i) Removal of all organic material and topsoil, (ii) placement of underdrainage systems, (iii) installation of surface drainage systems, (iv) placement and compaction of fill materials, and (v) revegetation. The registered engineer or other qualified professional specialist shall provide to the regulatory authority a certified report within 2 weeks after each inspection that the fill has been constructed as

specified in the design approved by the regulatory authority. A copy of the report shall be retained at the minesite.

(11) Coal processing wastes shall not be disposed of in head-of-hollow or valley fills, and may only be disposed of in other excess spoil fills, if such waste is—

(i) Demonstrated to be nontoxic and nonacid forming; and

(ii) Demonstrated to be consistent with the design stability of the fill.

(12) If the disposal area contains springs, natural or manmade watercourses, or wet-weather seeps, an underdrain system consisting of durable rock shall be constructed from the wet areas in a manner that prevents infiltration of the water into the spoil material. The underdrain system shall be protected by an adequate filter and shall be designed and constructed using standard geotechnical engineering methods.

(13) The foundation and abutments of the fill shall be stable under all conditions of construction and operation. Sufficient foundation investigation and laboratory testing of foundation materials shall be performed in order to determine the design requirements for stability of the foundation. Analyses of foundation conditions shall include the effect of underground mine workings, if any, upon the stability of the structure.

(14) Excess spoil may be returned to underground mine workings, but only in accordance with a disposal program approved by the regulatory authority and MSHA.

(15) Disposal of excess spoil from an upper actively mined bench to a lower pre-existing bench by means of gravity transport is permitted provided that:

(i) The operator receives the prior written approval of the regulatory authority upon demonstration by the operator that the spoil to be disposed of by gravity transport is not necessary for elimination of the highwall and return of the upper bench to approximate original contour;

(ii) The following conditions and performance standards in addition to the environmental performance standards of this part are met:

(A) The highwall of the lower bench intersects (meets) the upper actively

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mined bench with no natural slope between them;

(B) The gravity transport points are determined on a site specific basis by the operator and approved by the regulatory authority to minimize hazards to health and safety and to ensure that damage will be minimized should spoil accidentally move down-slope of the lower bench;

(C) The excess spoil is placed only on solid portions of the lower pre-existing bench;

(D) All excess spoil on the lower solid bench, including that spoil immediately below the gravity transport points, is rehandled and placed in a controlled manner to eliminate as much of the lower highwall as practicable. Rehandling and placing the excess spoil on the lower solid bench shall consist of placing the excess spoil in horizontal lifts in a controlled manner, concurrently compacted as necessary to ensure mass stability and prevent mass movement, and graded to allow surface and subsurface drainage to be compatible with the natural surroundings to ensure a long term static safety factor of 1.3. Spoil on the bench prior to the current mining operation need not be rehandled except to ensure stability of the fill.

(E) A safety berm is constructed on the solid portion of the lower bench prior to gravity transport of the excess spoil. Where there is insufficient material on the lower bench to construct a safety berm, only that amount of spoil necessary for the construction of the berm may be gravity transported to the lower bench prior to construction of the berm. The safety berm must be removed by the operator by final grading operations;

(F) The area of the lower bench used to facilitate the disposal of excess spoil is considered a disturbed area.

(b) *Valley fills.* Valley fills shall meet all of the requirements of paragraph (a) of this section and the additional requirements of this section.

(1) The fill shall be designed to attain a long-term static safety factor of 1.5 based upon data obtained from subsurface exploration, geotechnical testing, foundation design, and accepted engineering analyses.

(2) A subdrainage system for the fill shall be constructed in accordance with the following:

(i) A system of underdrains constructed of durable rock shall meet the requirements of paragraph (2)(iv) of this section and:

(A) Be installed along the natural drainage system;

(B) Extend from the toe to the head of the fill; and

(C) Contain lateral drains to each area of potential drainage or seepage.

(ii) A filter system to insure the proper functioning of the rock underdrain system shall be designed and constructed using standard geotechnical engineering methods.

(iii) In constructing the underdrains, no more than 10 percent of the rock may be less than 12 inches in size and no single rock may be larger than 25 percent of the width of the drain. Rock used in underdrains shall meet the requirements of paragraph (2)(iv) of this section. The minimum size of the main underdrain shall be:

Total amount of fill material	Predominant type of fill material	Minimum size of drain, in feet	
		Width	Height
Less than 1,000,000 yd ³	Sandstone	10	4
Do	Shale	16	8
More than 1,000,000 yd ³	Sandstone	16	8
Do	Shale	16	16

(iv) Underdrains shall consist of non-degradable, non-acid or toxic forming rock such as natural sand and gravel, sandstone, limestone, or other durable rock that will not slake in water and will be free of coal, clay or shale.

(3) Spoil shall be hauled or conveyed and placed in a controlled manner and concurrently compacted as specified by the regulatory authority, in lifts no greater than 4 feet or less if required by the regulatory authority to—

(i) Achieve the densities designed to ensure mass stability;

(ii) Prevent mass movement;

(iii) Avoid contamination of the rock underdrain or rock core; and

(iv) Prevent formation of voids.

(4) Surface water runoff from the area above the fill shall be diverted away from the fill and into stabilized diversion channels designed to pass safely the runoff from a 100-year, 24-hour precipitation event or larger

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event specified by the regulatory authority. Surface runoff from the fill surface shall be diverted to stabilized channels off the fill which will safely pass the runoff from a 100-year, 24-hour precipitation event. Diversion design shall comply with the requirements of § 715.17(c).

(5) The tops of the fill and any terrace constructed to stabilize the face shall be graded no steeper than 1v:20h (5 percent). The vertical distance between terraces shall not exceed 50 feet.

(6) Drainage shall not be directed over the outslope of the fill.

(7) The outslope of the fill shall not exceed 1v:2h (50 percent). The regulatory authority may require a flatter slope.

(c) *Head-of-hollow fills.* Disposal of spoil in the head-of-hollow fill shall meet all standards set forth in paragraphs (a) and (b) and the additional requirements of this section.

(1) The fill shall be designed to completely fill the disposal site to the approximate elevation of the ridgeline. A rock-core chimney drain may be utilized instead of the subdrain and surface diversion system required for valley fills. If the crest of the fill is not approximately at the same elevation as the low point of the adjacent ridgeline, the fill must be designed as specified in paragraph (b), with diversion of runoff around the fill. A fill associated with contour mining and placed at or near the coal seam, and which does not exceed 250,000 cubic yards may use the rock-core chimney drain.

(2) The alternative rock-core chimney drain system shall be designed and incorporated into the construction of head-of-hollow fills as follows:

(i) The fill shall have, along the vertical projection of the main buried stream channel or rill a vertical core of durable rock at least 16 feet thick which shall extend from the toe of the fill to the head of the fill, and from the base of the fill to the surface of the fill. A system of lateral rock underdrains shall connect this rock core to each area of potential drainage or seepage in the disposal area. Rocks used in the rock core and underdrains shall meet the requirements of paragraph (b)(2)(iv).

(ii) A filter system to ensure the proper functioning of the rock core shall be designed and constructed using standard geotechnical engineering methods.

(iii) The grading may drain surface water away from the outslope of the fill and toward the rock core. The maximum slope of the top of the fill shall be 1v:33h (3 percent). Instead of the requirements of paragraph (a)(7) of this section, a drainage pocket may be maintained at the head of the fill during and after construction, to intercept surface runoff and discharge the runoff through or over the rock drain, if stability of the fill is not impaired. In no case shall this pocket or sump have a potential for impounding more than 10,000 cubic feet of water. Terraces on the fill shall be graded with a 3- to 5-percent grade toward the fill and a 1-percent slope toward the rock core.

(3) The drainage control system shall be capable of passing safely the runoff from a 100-year, 24-hour precipitation event, or larger event specified by the regulatory authority.

(d) *Durable rock fills.* In lieu of the requirements of paragraphs (b) and (c) of this section the regulatory authority may approve alternate methods for disposal of hard rock spoil, including fill placement by dumping in a single lift, on a site specific basis, provided the services of a registered professional engineer experienced in the design and construction of earth and rockfill embankments are utilized and provided the requirements of this paragraph and paragraph (a) are met. For this section, hard rock spoil shall be defined as rockfill consisting of at least 80 percent by volume of sandstone, limestone, or other rocks that do not slake in water. Resistance of the hard rock spoil to slaking shall be determined by using the slake index and slake durability tests in accordance with guidelines and criteria established by the regulatory authority.

(1) Spoil is to be transported and placed in a specified and controlled manner which will ensure stability of the fill.

(i) The method of spoil placement shall be designed to ensure mass stability and prevent mass movement in

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accordance with the additional requirements of this section.

(ii) Loads of noncemented clay shale and/or clay spoil in the fill shall be mixed with hard rock spoil in a controlled manner to limit on a unit basis concentrations of noncemented clay shale and clay in the fill. Such materials shall comprise no more than 20 percent of the fill volume as determined by tests performed by a registered engineer and approved by the regulatory authority.

(2)(i) Stability analyses shall be made by the registered professional engineer. Parameters used in the stability analyses shall be based on adequate field reconnaissance, subsurface investigations, including borings, and laboratory tests.

(ii) The embankment which constitutes the valley fill or head-of-hollow fill shall be designed with the following factors of safety:

Case	Design condition	Minimum factor of safety
I	End of construction	1.5
II	Earthquake	1.1

(3) The design of a head-of-hollow fill shall include an internal drainage system which will ensure continued free drainage of anticipated seepage from precipitation and from springs or wet weather seeps.

(i) Anticipated discharge from springs and seeps and due to precipitation shall be based on records and/or field investigations to determine seasonal variation. The design of the internal drainage system shall be based on the maximum anticipated discharge.

(ii) All granular material used for the drainage system shall be free of clay and consist of durable particles such as natural sands and gravels, sandstone, limestone or other durable rock which will not slake in water.

(iii) The internal drain shall be protected by a properly designed filter system.

(4) Surface water runoff from the areas adjacent to and above the fill shall not be allowed to flow onto the fill and shall be diverted into stabilized channels which are designed to pass safely the runoff from a 100-year, 24-

hour precipitation event. Diversion design shall comply with the requirements of §715.17(c).

(5) The top surface of the completed fill shall be graded such that the final slope after settlement will be no steeper than 1v:20h (5 percent) toward properly designed drainage channels in natural ground along the periphery of the fill. Surface runoff from the top surface of the fill shall not be allowed to flow over the outslope of the fill.

(6) Surface runoff from the outslope of the fill shall be diverted off the fill to properly designed channels which will pass safely a 100-year, 24-hour precipitation event. Diversion design shall comply with the requirements of §715.17(c).

(7) Terraces shall be constructed on the outslope if required for control of erosion or for roads included in the approved postmining land use plan. Terraces shall meet the following requirements:

(i) The slope of the outslope between terrace benches shall not exceed 1v:2h (50 percent.).

(ii) To control surface runoff, each terrace bench shall be graded to a slope of 1v:20h (5 percent) toward the embankment. Runoff shall be collected by a ditch along the intersection of each terrace bench and the outslope.

(iii) Terrace ditches shall have a 5-percent slope toward the channels specified in paragraph (d)(6) of this section, unless steeper slopes are necessary in conjunction with approved roads.

(e) *Preexisting benches.* (1) The regulatory authority may approve the disposal of excess spoil through placement on preexisting benches: *Provided*, That the standards set forth in paragraphs (a)(1)–(a)(5) and (a)(7)–(a)(14) of this section and the requirements of this paragraph (e) are met.

(2) All spoil shall be placed on the solid portion of the preexisting bench.

(3) The fill shall be designed, using standard geotechnical analysis, to attain a long-term static safety factor of 1.3 for all portions of the fill.

(4) The preexisting bench shall be backfilled and graded to—

(i) Achieve the most moderate slope possible which does not exceed the angle of repose, and

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(ii) Eliminate the highwall to the extent practicable.

[44 FR 30628, May 25, 1979, as amended at 46 FR 37233, July 17, 1981; 47 FR 18555, Apr. 29, 1982]

§ 715.16 Topsoil handling.

To prevent topsoil from being contaminated by spoil or waste materials, the permittee shall remove the topsoil as a separate operation from areas to be disturbed. Topsoil shall be immediately redistributed according to the requirements of paragraph (b) of this section on areas graded to the approved postmining configuration. The topsoil shall be segregated, stockpiled, and protected from wind and water erosion and from contaminants which lessen its capability to support vegetation if sufficient graded areas are not immediately available for redistribution.

(a) *Topsoil removal.* All topsoil to be salvaged shall be removed before any drilling for blasting, mining, or other surface disturbance.

(1) All topsoil shall be removed unless use of alternative materials is approved by the regulatory authority in accordance with paragraph (a)(4) of this section. Where the removal of topsoil results in erosion that may cause air or water pollution, the regulatory authority shall limit the size of the area from which topsoil may be removed at any one time and specify methods of treatment to control erosion of exposed overburden.

(2) All of the A horizon of the topsoil as identified by soil surveys shall be removed according to paragraph (a) and then replaced on disturbed areas as the surface soil layers. Where the A horizon is less than 6 inches, a 6-inch layer that includes the A horizon and the unconsolidated material immediately below the A horizon (or all unconsolidated material if the total available is less than 6 inches) shall be removed and the mixture segregated and replaced as the surface soil layer.

(3) Where necessary to obtain soil productivity consistent with postmining land use, the regulatory authority may require that the B horizon or portions of the C horizon or other underlying layers demonstrated to have comparable quality for root de-

velopment be segregated and replaced as subsoil.

(4) Selected overburden materials may be used instead of, or as a supplement to, topsoil where the resulting soil medium is equal to or more suitable for vegetation, and if all the following requirements are met:

(i) The permittee demonstrates that the selected overburden materials or an overburden-topsoil mixture is more suitable for restoring land capability and productivity by the results of chemical and physical analyses. These analyses shall include determinations of pH, percent organic material, nitrogen, phosphorus, potassium, texture class, and water-holding capacity, and such other analyses as required by the regulatory authority. The regulatory authority also may require that results of field-site trials or greenhouse tests be used to demonstrate the feasibility of using such overburden materials.

(ii) The chemical and physical analyses and the results of field-site trials and greenhouse tests are accompanied by a certification from a qualified soil scientist or agronomist.

(iii) The alternative material is removed, segregated, and replaced in conformance with this section.

(b) *Topsoil redistribution.* (1) After final grading and before the topsoil is replaced, regraded land shall be scarified or otherwise treated to eliminate slippage surfaces and to promote root penetration.

(2) Topsoil shall be redistributed in a manner that—

(i) Achieves an approximate uniform thickness consistent with the postmining land uses;

(ii) Prevents excess compaction of the spoil and topsoil; and

(iii) Protects the topsoil from wind and water erosion before it is seeded and planted.

(c) *Topsoil storage.* If the permit allows storage of topsoil, the stockpiled topsoil shall be placed on a stable area within the permit area where it will not be disturbed or be exposed to excessive water, wind erosion, or contaminants which lessen its capability to support vegetation before it can be redistributed on terrain graded to final contour. Stockpiles shall be selectively placed and protected from wind and